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69-326 INVESTIGATION
Proposed Pipe Line
and Separator
Republic Creosoting Co.
St. Louis Park, Minnesota

REPUBLIC CREOSOTING COMPANY

August 10, 1970

802526



SOIL ENGINEERING SERVICES, INC.

6800 S. COUNTY RD 18

MINNEAPOLIS, MINN • PHONE 941-5600

August 10, 1970

MAILING ADDRESS
P.O BOX 35108
MPLS, MINN. 55435

Republic Creosoting Company
Division of Reilly Tar & Chemical Corp.
7200 Walker Street
Minneapolis, Minnesota 55426

Attn: Mr. Herb Finch

Re: 69-326 INVESTIGATION
Proposed Pipe Line and
Separator
Republic Creosoting Company
St. Louis Park, Minnesota

Gentlemen:

As you requested, soil borings have been taken to assist in evaluating the soil and foundation conditions for a proposed pipe line and separator unit to be constructed at the Republic Creosoting Company of St. Louis Park. Previous borings on this site, which were reported on October 13, 1969, were also used in this evaluation.

The borings were taken at locations indicated by Mr. Herb Finch. Surface elevations were referenced to the elevation of one of the previous borings, ST-20, which had an elevation of 182.5 as determined by the Dolan Engineering Company.

The borings were taken on August 4, 1970, with a truck-mounted core and auger drill equipped with hollow-stem augers. Samples were taken thru the hollow-stem augers with the standard 2-inch OD split sampler driven by a 140-pound hammer falling 30-inches. Blows per foot of penetration (BPF), which are an index of the bearing capacity of the soils, were recorded. In the soil conditions encountered on this site, the use of hollow-stem augers eliminated the driving of casing. Jetting water was used to clear the auger in two of the borings.

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Soils encountered in the borings were visually classified in accordance with the U.S. Bureau of Chemistry and Soils Classification System. A copy of that chart is attached. Some representative samples will be retained in this office for a period of 60 days to be available for examination.

Each boring was probed immediately after its completion to check for the presence of ground water. All borings were then rechecked three days later.

RESULTS

Logs of soils encountered, penetration resistances, and water level observations are shown on the attached LOG OF BORING sheets.

The borings encountered loose to medium dense loamy sand and sandy loam fill over strata of very soft to soft organic peat, muck and marl. Beneath the organic materials lay loose to medium dense sand. The following tabulation shows the depth and thickness of organic materials:

<u>Boring</u>	<u>Surface Elevation</u>	<u>Depth to Top of Organic Material (ft)</u>	<u>Depth to Bottom of Organic Mat. (ft)</u>	<u>Thickness (feet)</u>
ST-1	181.3	6	12	6
ST-2	181.0	4	25+	21+
ST-3	181.0	8	19	11
ST-6	181.1	5	18	13
ST-4	181.4	2	8	6
ST-5	180.5	4	13	9
ST-14*	181.2	4	14.5	10.5
ST-17*	182.2	4	19.5	15.5
ST-18*	181.3	11	29.5	18.5
ST-20*	182.5	4	12	8
ST-21*	181.6	0	4	4

*Boring from previous report of October 13, 1969.

Boring ST-2 was terminated at the 25-foot depth because at the time of drilling, it was not known that a sewer line was planned and a better location for the separator had been encountered in ST-1. Nearby borings indicate that the depth of the bottom of the peat stratum would be less than 30 feet.

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Water levels ranged from 1 foot below surface at the northwesternmost boring to 3 feet below the surface at the southeasternmost boring. Water levels should be expected to show normal seasonal and annual fluctuations.

RECOMMENDATIONS

It has been indicated that the proposed sewer line would connect to a main line under Walker Street at approximately an 8-foot depth. Somewhere along the proposed line would be a separator to separate waste water and human wastes from industrial wastes. One component of this separator would be a fairly large concrete tank above ground level. Since the project is tentative, the following recommendations are of a general nature.

Typical sewer lines in Minneapolis are at least 6 feet below the surface to avoid freezing. This would place the line in the peat and muck which have very little strength and are highly compressible. Shifting and settlement up to 4 inches or more could be expected. Under similar conditions, typical sewer lines would be supported on piling when the organic soils extend to more than 18 feet below the surface and on compacted backfill (placed after excavating organic soils from an area wide enough to provide slopes of backfill not steeper than 1:1 from the top of the pipe) where organic soils extend less than 12 feet below the surface. Between 12 and 18-foot depths, either approach is feasible, and the method chosen depends on site conditions, available fill, and equipment available. For the current borings, piling would appear to be required between borings ST-1 and ST-4 and excavation-backfill between borings ST-4 and Walker Street.

Pile lengths would be approximately 15 to 20 feet into the sand and gravel for 20-ton capacity piles. The weight of the sewer pipe would be small, but the piles must be able to support the sand above the pipe as the peat consolidates.

The above procedures would be relatively expensive and on this site it may be possible to obtain a satisfactory sewer at considerably less cost. The sand fill has been in place for a long time and most of the consolidation occurring under this fill has already occurred. We suggest the consideration of using steel pipe with steeper than normal invert grade lines to overcome settlement that may occur. Steel pipe has considerable tolerance to differential settlement and the invert grade line is arbitrary when one considers that a lift pump will be required for the separator anyhow. If this approach is pursued, it is important that excavations be backfilled so as to duplicate existing soil conditions (i.e. sand over peat) and attempt to prevent a new cycle of consolidation.

8/10/70

For a concrete tank, a foundation to minimize differential settlement would be necessary. The best boring location for this purpose would be at ST-4. The organic materials (down to 8-foot depth) could be excavated and the excavation backfilled with material placed in thin lifts and compacted in a controlled manner to a specified density. Borings to determine depths of organic materials across the proposed separator site are suggested to determine required depths of excavation for the entire site.

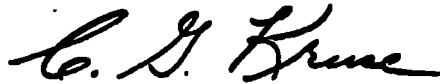
The location of previous boring ST-21 has relatively dense sand and gravel at frost footing depth of 4 feet. If this condition exists over a space large enough for a separator, the foundations could be placed at this location with a minimum of excavation and backfilling.

Of necessity, the area of the borings in relation to the area of the site, and the depth of the borings, are limited. Suggestions and/or recommendations of this report are opinions based upon the data obtained from the borings.

If we can be of further assistance in evaluating these data, taking additional borings, or providing more detailed information with regard to a specific proposal, kindly contact us at your convenience.

Very truly yours,

SOIL ENGINEERING SERVICES, INC.



C. G. Kruse, P.E.
Soils Engineer

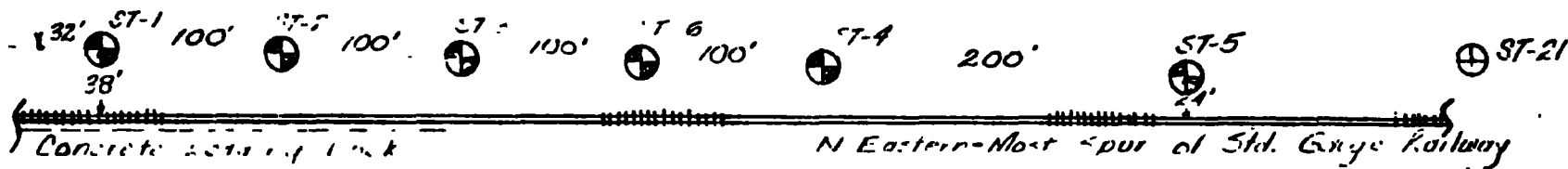
BMT/CGK:mlk
Enclosures

Office
Lab

2 1/2'

Scale
1" = 100'

⊕ ST-17



⊕ ST-18

⊕ ST-20

69-326

SOIL ENGINEERING SERVICES, INC.

6800 S. COUNTY RD. 12
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SKETCH SHOWING LOCATION OF PENETRATION TEST BORINGS

- ⊕ Penetration Test Borings, Current Report
- ⊕ Penetration Test Borings, Previous Report

BORINGS TESTS INSPECTION ANALYSIS REPORTS RECOMMENDATIONS

302521

PROJECT: 69-326

Proposed Pipeline
Republic Creosoting Company
St. Louis Park, Minnesota

BORING: ST-1**LOCATION:** North end of string of borings**DATE:** 8/4/70**SCALE:** 1" = 4'

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
181.3	0'				
		Fill. Loamy Sand & Sandy Loam, slightly plastic, black (with creosote), wet to saturated (medium dense to loose)	9 5	▽	
175.3	6'				
		Peat and Muck, black, moist (soft to medium)	3 7		
169.3	12'				jetting water used to clear auger below 11'
		Fine to Medium Sand, with trace of Fine to Medium Gravel, dark grey to grey and brown, wet (loose to very loose)	6 3		
156.3	25'		4		
		Water level down 2' when measured immediately after completion of boring, and down 1' when rechecked 3 days later.			

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PROJECT: 69-326 Proposed Pipeline Republic Creosoting Company St. Louis Park, Minnesota			BORING: ST-2 LOCATION: See sketch		
			DATE: 8/4/70	SCALE: 1" = 4'	
Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
181.0	0'				
		Fill. Loamy Sand & Sandy Loam, slightly plastic, trace of Fine Gravel, black (with creosote), moist to wet (loose)	8	▽	
177.0	4'		2		
		Peat, Muck and Marl, black to grey, moist to wet (soft to very soft)	2		
			1		
			1		
			3		
156.0	25'				
		Water level down 2' when measured immediately after completion of boring and down 1.5' when rechecked 3 days later.			

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PROJECT: 69-326

Proposed Pipeline
Republic Creosoting Company
St. Louis Park, Minnesota

BORING: ST-3

LOCATION:
See attached sketch

DATE: 8/4/70

SCALE: 1" = 4'

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
181.0	0'				
		Fill. Loamy Sand & Sandy Loam, slightly plastic, with trace of Fine Gravel, black (with creosote), wet (medium dense to very loose)	9 10	▽	
173.0	8'		4		
		Peat and Muck, black, moist (soft)	3 3		
162.0	19'				
		Fine to Medium Sand & Gravel, grey, wet (loose)	6		
156.0	25'				
		Water level down 2' when measured immediately after completion of boring and down 1.5' when rechecked 3 days later.			

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PROJECT: 69-326

Proposed Pipeline
 Republic Creosoting Company
 St. Louis Park, Minnesota

BORING: ST-4

LOCATION:
 See attached sketch

DATE: 8/4/70

SCALE: 1' = 4'

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
181.4	0'				
179.4	2'	Fill. Fine to Medium Sand & Gravel, brown, moist		▽	
		Loam, plastic, brown to Peat, black, moist to wet, (soft)	3		
			2		
173.4	8'		4		
		Sand and Gravel, grey, moist to wet (medium dense)	11		
			10		
			11		
156.4	25'		11		
		Water level down 17' when measured immediately after completion of boring and down 2' when rechecked 3 days later.			

jetting water used to
 clear auger below 15'

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PROJECT: 69-326

Proposed Pipeline
Republic Creosoting Company
St. Louis Park, Minnesota

BORING: ST-5**LOCATION:** South end of string of borings**DATE:** 8/4/70**SCALE:** 1" = 4'

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
180.5	0'				
		Fill. Fine to Medium Sand & Gravel, brown, moist (medium dense)	9	▽	
176.5	4'				
		Peat and Muck, black, moist (soft to rather soft)	2		
			3		
			4		
167.5	13'				
		Fine to Medium Sand with little Gravel, grey, wet to saturated (medium dense)	10		
			11		
155.5	25'				
		Water level down 3' when rechecked 3 days later.			

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PROJECT: 69-326

Proposed Pipeline
 Republic Creosoting Company
 St. Louis Park, Minnesota

BORING: ST-6

LOCATION:

See attached sketch

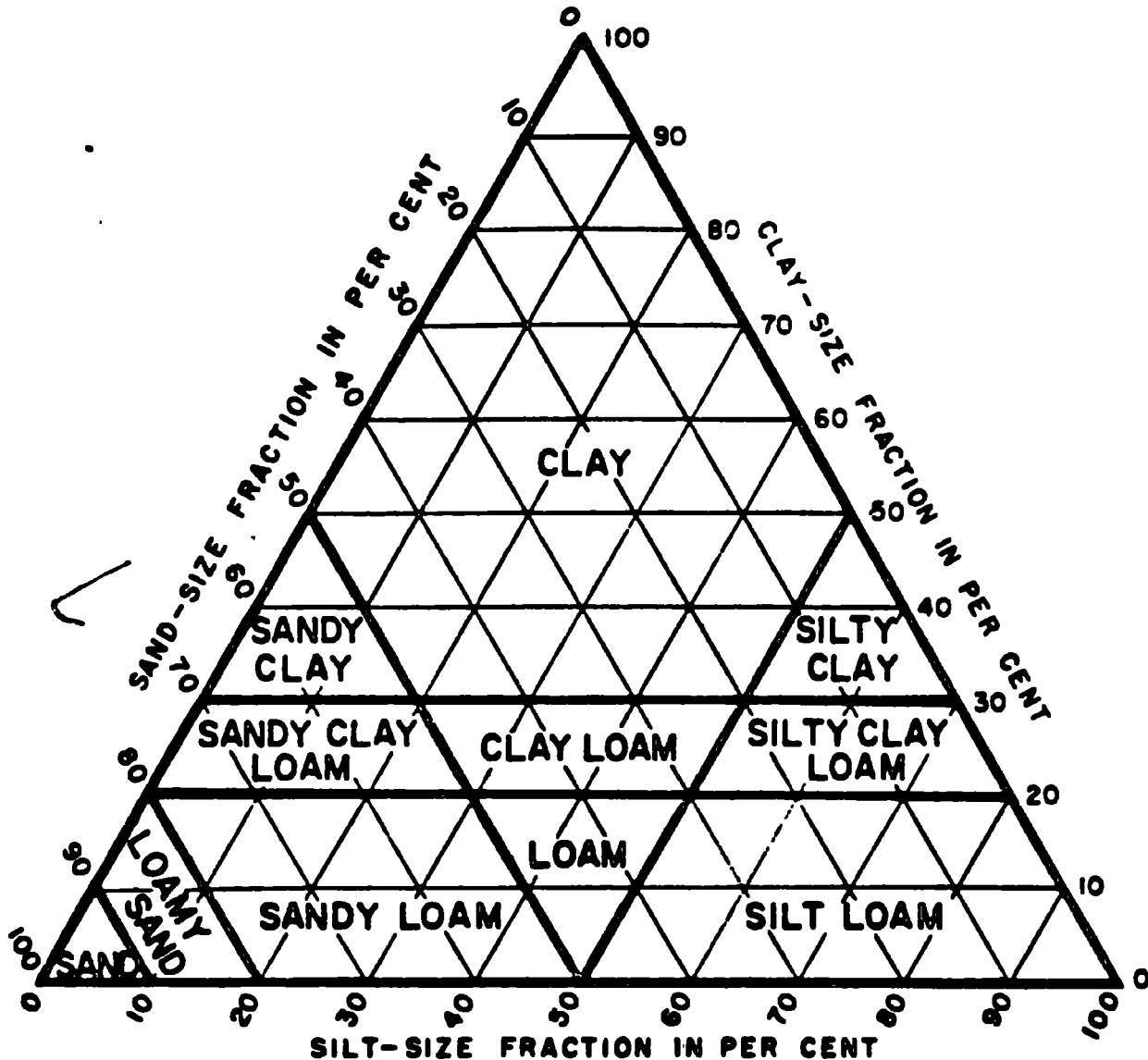
DATE: 8/4/70

SCALE: 1" = 4'

Elev.	Depth	Description of Materials	BPF	WL	Tests or Notes
181.1	0'				
		Fill. Fine to Medium Sand, with trace of Fine Gravel, brown to grey, moist (loose to medium dense)	7	▽	
176.1	5'		11		
		Peat and Muck, black, (moist)	3		
			2		
			4		
163.1	18'				
161.1	20'	Fine to Medium Sand, with a little Gravel, grey, wet (loose)	7		
		Water level down 9' when measured immediately after completion of boring, and down 2' when rechecked 3 days later.			

302537

SOIL ENGINEERING SERVICES INC.



SOILS

TEXTURAL CLASSIFICATION CHART

ADAPTED FROM U.S. BUREAU OF CHEMISTRY AND SOILS

SIZES OF SOIL SEPARATES

<u>FRACTION</u>	<u>PARTICLE DIAMETER</u>
SAND -----	FROM 2.0 TO 0.074 MM.
SILT -----	FROM 0.074 TO 0.005 MM.
CLAY -----	LESS THAN 0.005 MM.

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